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Optimization of bioremediation of free cyanide containing wastewater by *Fusarium oxysporum* grown on beetroot waste using response surface methodology

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The use of cyanide in mineral industry is vast despite its toxicity due to its strong affinity for metals, thus the release of free cyanide into the environment via partial treatment of wastewater. However, the sustainability of any process does not only depend on the turnover time but also on the management of waste generated. As a result, a discharge limit was set for free cyanide in wastewater by different jurisdictions in order to protect the environment. This work reports the use of a cyanide resistant fungus *Fusarium oxysporum* in free cyanide remediation of wastewater, its preference for beetroot agro-waste, and its optimization using statistical modeling of response surface methodology (RSM). Higher growth rate of *Fusarium oxysporum* was observed on beetroot waste (OD = 3.430) compared with glucose substrate (OD = 1.953). The highest free cyanide biodegraded was 180.9 mg CN-/L from initial 300 mg CN-/L after 72 h at 25°C, pH of 12.70, and substrate concentration of 300 mg/L. The ANOVA of the quadratic model indicated the model is highly significant at 99.98% level. The response from the central composite design (CCD) shows that temperature and substrate concentration are the most significant factors affecting the free cyanide biodegradation. The fungus growth on cheap agro-waste would ensure economic sustainability of free cyanide biodegradation in environmental applications.

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Constructible properties and combined bacterial species in pediatric nutrition

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Probiotics are defined as live microorganisms that, when administered in adequate amounts, confer a health benefit on the host. Recent research has suggested that probiotics exert a wide range of effects through different mechanisms and sites of action, dependent on the host. Although the European Food Safety Agency has evaluated current probiotic strains insufficient characterized and clinical research ample for health claim approval, consumers (e.g. in the US) are interested in potential therapeutic and preventive health benefits. The Food and Agriculture Organization of the United Nations and the World Health Organization provide guidelines for probiotics :

1. Proper identification to the level of strain of all probiotics in the product, with deposit of all strains in an international culture collection

2. Characterization of each strain for traits important to its safety and function

3. Validation of health benefits in human studies, including identification of the quantity of the microorganism required to provide the benefit

4. Truthful and not misleading labeling of efficacy claims and content through the end of shelf life

Over the last years we have seen examples of genetically modified strains with adapted physiological properties compared to the parenteral strain, as well as combinations of strains applied and these provide a start for prosperous future developments. The genetic modifications can impact improved survival retention in the gastro-intestinal tract, cell cycle, cell wall, antibiotic resistance, and biochemical metabolic properties of the strains. An excellent example is Lactobacillus reuteri which has been used widely in infant follow up nutritional formulas. The current guidelines that any strain of microorganism that would be assigned to a group would be freed from the need for further safety assessment is insufficient to guarantee any health impact in short and long term. It is therefore crucial that improved guidelines allow flexible developments to secure quality and safety, specifically when it concerns infants and premature infants, or metabolically compromised individuals and when it concerns the possible long-term effects.

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